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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,038	12/04/2003	Kazuyuki Mitsuoka	33082M185	4856
7590 Smith, Gambrell & Russell 1850 M Street, N.W., Suite 800 Washington, DC 20036			EXAMINER SELLMAN, CACHET I	
			ART UNIT 1792	PAPER NUMBER
			MAIL DATE 05/20/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/727,038

**Applicant(s)**

MITSUOKA ET AL.

**Examiner**

CACHET I. SELLMAN

**Art Unit**

1792

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10/19/2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 8, 9, 13, 20, 21, 25, 26, 28-30 and 32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 8-9, 13, 20-21, 25-26, 28-30 and 32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/19/2007 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 8, 9, 26, and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gallagher et al. (US 2002/0123240 A1) in view of Ross (US 2001/0000415 A1) and Angelopoulos et al. (US 6420088 B1).

Gallagher et al. discloses a process of applying a liquid film to the surface of an organic film by modifying the organic film by curing in an oxidizing atmosphere without the use of UV radiation [0012] to impart an infinity for the liquid coating ([0032] and abstract) and then applying the liquid coating to the organic film. Gallagher et al. teaches that the process can be performed in an argon/oxygen atmosphere [0031].

Gallagher et al. does not disclose the use of electron beams, that the liquid film is polar, or that the modifying step comprises curing at a first pressure below 1 torr and voltage and imparting affinity at a second pressure above 1 torr than the first and a second voltage as required by **claims 1 and 26**.

Ross discloses a process of treating the surface of dielectric films for subsequent deposition by curing using electron beam exposure. The dielectric film can be a silicon containing polymer such as a silsesquioxane polymer [0027]. The layer is formed on the substrate and is then cured using electron beam exposure. The exposure can be formed in a gaseous ambient of any combination of nitrogen, hydrogen, argon, or oxygen [0041].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Gallagher et al. to include the use of electron beams to cure and modify the layer. One would have been motivated to do so because both disclose processes of curing and modifying a silsesquioxane layer in an atmosphere of argon/oxygen without the use of UV light and Ross further discloses that using the electron beam removes all moisture and contaminants from the surface of the silsesquioxane layer and provides a surface treatment so the other layers will adhere to it therefore one would have a reasonable expectation of success in curing and modifying the layer.

Angelopoulos et al. discloses antireflective/hardmask compositions that are used in lithographic process for electronic devices (abstract), where the layer provides outstanding optical, mechanical and etch selectivity properties and to configure underlying materials such as semiconductor layers (abstract). The composition contains a polymer having SiO moieties (column 3, line 8) and a solvent such as propylene glycol monomethyl ether acetate, cyclohexanone, and ethyl cellosolve acetate (column 7, lines 1-6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Gallagher et al. to include using the antireflective/hardmask composition of Angelopoulos et al. One would have been motivated to do so because Gallagher et al. teaches that process is performed to improve the adherence of a photoresist or antireflective layer to the organic film [0006, 0013, 0032] and Angelopoulos et al. teaches that the antireflective/hardmask composition provides outstanding etch selectivity, optical and mechanical properties therefore one would have a reasonable expectation of success in forming the layer.

Ross teaches that the substrate temperature can be from 25 – 1050°C [0040]. Ross also teaches that there is a difference between process conditions when just curing the film versus curing and treating the film [0040-41] and one having ordinary skill in the art can adjust the process conditions in order to treat the surface i.e. improve affinity for the inorganic film on the organic film [0041]. Therefore the pressure is a result effective variable. It would have been obvious to one having ordinary skill in the art at

the time the invention was made to modify the conditions to be within the claimed range in order to remove the moisture and particles on the surface and to prepare it for subsequent layers especially absent any criticality in using the conditions in the claimed range.

4. Claims 13, 20-21, 25, 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ross (US 2001/0000415 A1).

Ross discloses a process for forming an inorganic film on a surface of an organic film on a substrate in a processing vessel [0040] by modifying the organic film and imparting an affinity for the inorganic film by curing with electron beams in a rare gas atmosphere and forming an inorganic film over the organic film [abstract, 0039-0042]. The curing takes place in an electron beam irradiation device [0041].

Ross does not teach that the modifying step has a change in pressure where a first pressure is used during the curing of the film and a second pressure that is higher than the first where the first pressure is below 1 torr and the second is above 1 torr as required by **claims 13, and 30** or that a first voltage is applied at the curing step and a second voltage that is lower than the first is applied at the imparting step as required by **claims 20-21 and 30** or that the first voltage is above 20kV and the second is 20kV or below as required by **claim 32**.

However, Ross does teach that there is a difference between process conditions when just curing the film versus curing and treating the film [0040-41]. Ross also

teaches that one having ordinary skill in the art can adjust the process conditions in order to treat the surface i.e. improve affinity for the inorganic film on the organic film [0041]. Therefore the pressure is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the conditions to be within the claimed range in order to remove the moisture and particles on the surface and to prepare it for subsequent layers especially absent any criticality in using the conditions in the claimed range.

Ross teaches that the substrate temperature can be from 25 – 1050°C [0040].

Ross does not teach the pressure or the exact temperature range of **claim 25**. However, as stated above the process parameters are result effective variables therefore it would have been obvious to one having ordinary skill in the art to modify the process parameters within the claimed range through routine experimentation in order to remove the moisture and particles on the surface (i.e. increase affinity for subsequent layers) especially absent any criticality in using the conditions in the claimed range.

#### ***Response to Arguments***

The applicant argues that the variations in pressure during the electron beam irradiation process are not mere adjustments of parameters and using a pressure of below 1 torr for curing and above 1 torr for modifying are used to divide the modifying steps into individual effective sub steps for the respective purposed. Ross teaches that the

Art Unit: 1792

parameters for modifying and curing the film are different and can be adjusted in order to treat the organic film such as improve its affinity for the inorganic film.

On page 11, lines 2-15 and page 10, lines 7-20 of the specification, it states the difficulty in finding a single pressure for the rare gas atmosphere and discusses how the applicant optimized the variable in the order to obtain the pressure that will allow for the film to be cured and modified. This further supports the statements that he specific parameters can be obtained through experimentation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CACHET I. SELLMAN whose telephone number is (571)272-0691. The examiner can normally be reached on Monday through Friday, 7:00 - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 1792

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Cachet I Sellman  
Examiner  
Art Unit 1792

/C. I. S./  
Examiner, Art Unit 1792

/William Phillip Fletcher III/  
for Timothy H. Meeks, SPE of Art Unit 1792/1700